THE MORTALITY BY DISEASES IN LATVIA
IEDZĪVOTĀJU MIRSTĪBA NO SLIMĪBĀM LATVIJĀ

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Kopsavilkums

Latvijā ir visai augsta iedzīvotāju mirstība. Visos novados tā pārsniedz dzimstību. Viens no augstās mirstības cēloņiem ir sirds asinsvadu sistēmas slimības. Mirstību biežums pētīts atkarībā no reģiona iedzīvotāju izglītības, saimniecisko sekmju, zemes auglības un citu apstākļu atšķirībām. Iegūtie rezultāti liek domāt, ka augstie mirstības rādītāji ir skaidrojama ar iedzīvotāju nespēju piemēroties jauniem saimniecības apstākļiem.

Abstract

In Latvia the mortality of population in Latvia is very high. In some districts the mortality is several times higher than the birth rate. This leads to a negative population increment. One of the causes of death is the heart – circulation diseases. The mortality in different regions varies. Investigation the economic, cultural, geographical ethnic and social situation are used to solve the reasons of the unfavourable demographic situation. Special attention has been carried out to investigate the mortality rate and the indicators of adaptation to the market economy in various rural regions in Latvia. On X-axis is the mortality of residents from heart-circulation diseases in different regions of Latvia, on the Y-axis - various indicators of education, economic, social and cultural development.

It has been shown that in various rural regions in Latvia with different mortality of heart-circulation diseases there are differences with the various indicators of economic life and education level. In regions with higher percentage of residents with higher or secondary education the mortality by heart-circulation diseases are lower. This coincides also with higher pre school children enrolment in pre school establishments, and with lower enrolment in auxiliary and trade schools. In these regions children enter presumably schools with Russian instruction language. These regions are located in the eastern part of Latvia – Latgale, were the Russian speaking population has increased in the occupation period of Latvia not only as a result of migration of other Soviet Republics, but also as a lack of adequate school politics. Thus for example in the district of Daugavpils the most population have Latvian citizenship, however they enter the schools with Russian instructional language. The prestige of Latvian language is increasing in the latest period, presumably as a result of the universities in Daugavpils and Rēzekne. As a consequence the children enter more schools with the Latvian instructional language. Not only the mortality from heart – circulation diseases is increased in theses regions of Latvia, but also the total mortality. The birth rate is decreased and the increment of population has a negative sign (the population is dying out with a rate, which in Latgle is higher than 1% per year. High mortality coincides with lower education and with lower success in economic activities. Between them is the lower yield of cow's milk and agriculture output and the road quality. It should be mentioned that the fertility of soil in the districts of higher mortality is lower than in the districts of lower incidence of mortality by heart – circulation diseases. Various economic activities in regions with high ore low mortality of heart

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and circulation diseases were very different. Also predisposition to some other diseases, as diseases of gastrointestinal tract and suddenly poisoning and mortality as a result of external factors has been increased. That served to get motivation that all efforts to improve education including pre school children establishments are really important for Latvia.

In Latvia during the post-war time pre school establishments increased each year. At the school year 1988/89 the enrolment size was 140000, but it dropped very rapidly after 1990 because the schools were very dear in comparison with the earnings of parents. Also the decrease of population has been observed in all districts of Latvia.

Introduction

It is known that in Latvia the death rate of population is very high. The mortality heart of heart –circulation diseases is in the first place of Europe.
F. Guillot 1999 recently has given an overview of the role of coronary-heart diseases as one of the factors limiting the life span of human beings. These investigations concern mainly to North America and Western Europe. Atherosclerosis and atherothrombosis (acute thrombosis occurring in the presence of pre-existing atherosclerosis) are the major pathological processes involved in ischaemic stroke (IS), coronary heart disease (CHD) and peripheral arterial disease (PAD).

This overview presented by **F.Guillot** 1999 let to propose that mortality by hypertension might be considered also as an adoption syndrome.

Another place in Europe with high incidence of persons with hypertension and high cholesterol level is Finland.

In Latvia the reasons of mortality are not good investigated, because systematic investigations (regular dispanserisations) are yet not carried out. This article concerns only the mortality data, obtained from Latvian Statistical institute.

Mortality data in Latvia and various characteristics of economic situation with a particular focus on factors relating to their education have been analysed. The aim is to examine evidence from mortality studies of patients, emphasising the coexistence of mortality, and documenting the risk of mortality in territories with various living conditions. Especial attention has been devoted to the education level.

Materials and Method

The current investigations were carried out implementing data about the mortality by heart- circulation diseases in regions of Latvia (without the 7 Republic towns of Latvia). Data were obtained by the Statistical Yearbook of Latvian Medicine, issue 41.Riga 1998 (Latvijas Labklājības Ministrija Veselības Statistikas, Informācijas un Medicīnas tehnoloģiju centrs Medicīnas Statistikas Centrs: Latvijas Republikas Medicīnas statistikas gadagrāmata 41.izdevums: Rīga 1998.)

Data about education for the school year 1989/90 have been obtained from the calendar of Latvian University 1990/91.

Enrolment in pre school establishments in different regions of Latvia, published in Educational Institutions in Latvia at the beginning of school year 1997/98 Central Statistical Bureau of Latvia Riga 1998 PP 23-45. Date of agriculture production illustrates the situation at 1995 when the drop of agricultural production was the highest, which was dated by a collection of statistical data AGRICULTURE IN LATVIA by Central Statistical Bureau of Latvia Riga 1996.

The death rate of residents in different regions in Latvia, the unemployment rate was gathered from Monthly Bulletin of Latvian Statistics 1998 No2 (45).

The relationship between death rates of residents and agricultural production yields were used to characterise the life quality in the regions distinct to Baltic Sea and

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in remote regions. The data of the number of entering the secondary school with Russian ore Latvian instruction language were obtained from the Calendar of Latvian University 1990/91, at the period were the Russian language in some regions of Latvia were the more predominant.

Results are illustrated as the X-Y diagrams

Results were analysed as linear regressions between two variables. In most cases one variable was the enrolment rate in pre-school establishments divided by resident number, the second one- death rate of residents, expectable life time, education level, cows milk yield, or the yield of agriculture production and other data which can characterise the social, cultural and economic situation.

2. Resident population refers to all inhabitants whose legal place of residence is the respective administrative territory. District population figures comprise urban and rural residents across the territory of the given district with the exception of 7 cities under state jurisdiction. Emigration rate has been calculated by dividing the number of emigrated population between 1997 1-1X (from the first of January till the first of October) with resident population number as of October 1, 1997.The data have been acquired from Monthly Bulletin of Latvian Statistics No2, (45) 1998

Yield control sampling from land farms of various districts in Latvia has been documented from Latvian Statistics Bulletin 1996 which contains detailed information about agriculture in different regions of Latvia in 1995.

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Yield control sampling from land farms of various districts in Latvia has been documented from Latvian Statistics Bulletin 1996 which contains detailed information about agriculture in different regions of Latvia in 1995.

Results

Results are laid down as – an X-Y diagram where on X-axes is the mortality rate per 100000 residents of Latvia. For abbreviating typing the cause of mortality is defined as "the death from hypertension". Indeed this phrase means the death that in the Latvian Yearbook of Medical Statistics, Riga 1998, iss.41, is defined as the cause of death from the diseases of blood circulation diseases.

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Regression Output:

Constant	609.1913
Std Err of Y Est	41.02542
R Squared	0.342894
No. of Observats	26
Degrees of Freedom	24

X Coefficient(s) - 0.15627
Std Err of Coef. 0.044157

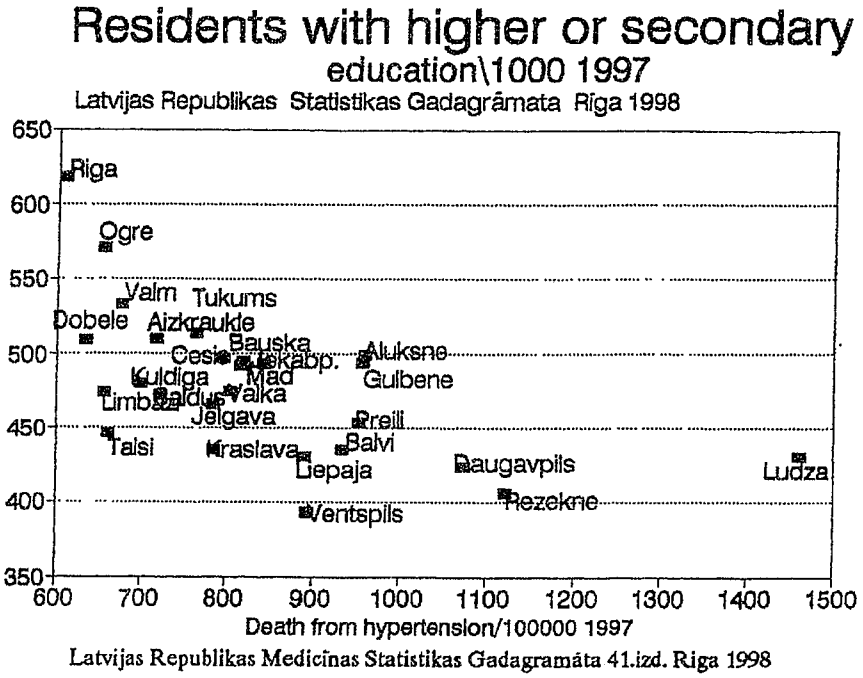

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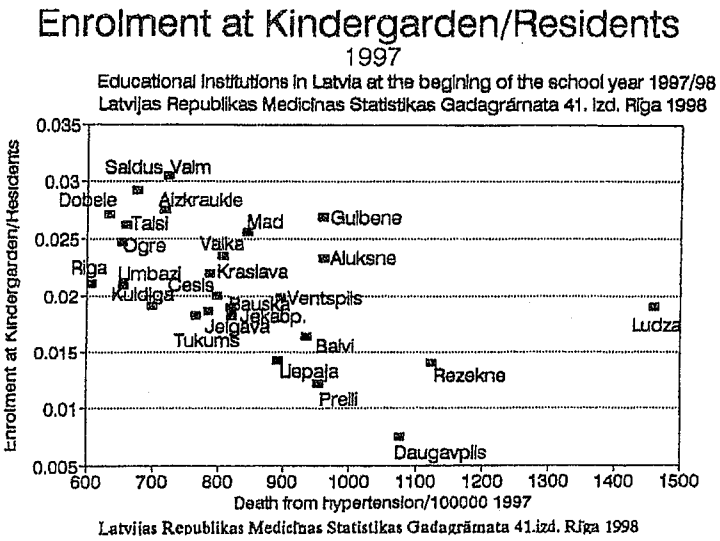
Fig.1

The relative number of residents with higher or secondary education is lower in the regions of Daugavpils, Rēzekne, Ventspils, Liepaja, but higher in the regions Riga, Ogre, Aizkraukle, Valmiera. The Standard Error of the X Coefficient is 3 times lower than the coefficient. The probability of the X Coefficient is more than 99%. That permits to judge that education enables the residents to adopt to market economy and that may be the reason why the death of circulation - coronary diseases may be reduced.



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Regression Output:

Constant	0.033328
Std Err of Y Est	0.004861
R Squared	0.250058
No. of Observations	26
Degrees of Freedom	24

X Coefficient(s) -1.5E-05
Std Err of Coef. 5.23E-06

Fig. 2

The enrolment at kindergarten to the number of residents decreases with increasing the mortality from heart and circulation diseases. At Balvi, Liepāja, Preiļi, Rēzekne, Daugavpils, Ludza the death from hypertension is high, but the enrolment at kindergarten is low. Perhaps the residents of theses regions as a lack of money have not the opportunity for enrolment of children in kindergarten. One should mention that the policy of emergency has changed the attitude to kindergartens and they are suspended not only from the parents of children. It is also known that a lack of transport and bad road conditions does not stimulate the transport of children to kindergarten. The Standard Error of the X Coefficient is 3 times lower than the coefficient. The probability of the X Coefficient is more than 99%. That permits to judge that enrolment of kinder in Kindergartens enables the residents to adopt to market economy and that may be the reason why the death of circulation - coronary diseases may be reduced.

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Regression Output:

Constant	- 0.06252
Std Err of Y Est	0.091422
R Squared	0.224942
No. of Observations	26
Degrees of Freedom	24
X Coefficient(s)	0.00026
Std Err of Coef.	9.84E-05

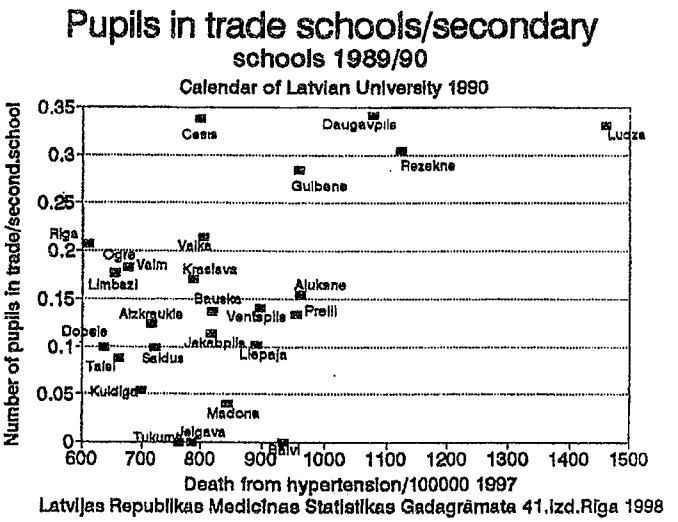

Fig.3

The enrolment of pupils in trade schools in ratio to secondary schools is increased in the regions with higher death rate from heart-circulation diseases. These are the regions of Eastern Latvia. The Standard Error of the X Coefficient is 2.8 times lower than the coefficient. The probability that the X Coefficient is positive - is more than 95%. That permits to judge that education in trade schools is not just the best way to acquire the necessary skills for adaptation to market economy and that may be the reason why the death of circulation - coronary diseases may be increased.

Regression Output:

Constant	- 0.01365
Std Err of Y Est	0.050697
R Squared	0.105856
No. of Observations	26
Degrees of Freedom	24
X Coefficient(s)	9.2E-05
Std Err of Coef.	5.46E-05

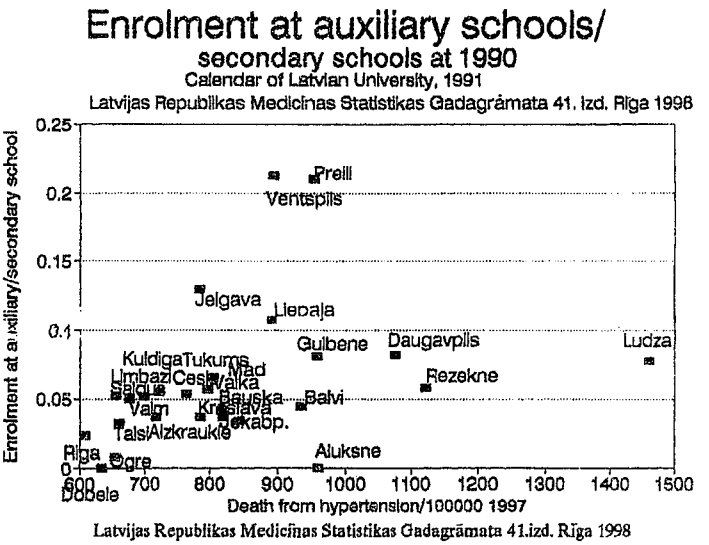

Fig.4

The number of children in auxiliary schools to basic secondary schools increases with increasing of mortality with heart-circulation diseases Daugavpils, Rēzekne, Ventspils, Liepāja are the regions with higher share of the children which are not capable of entering basic secondary schools, and are entering help- schools. The Standard Error of the X Coefficient is 2.7 times lower than the coefficient. The probability of the X Coefficient is 99%. Presumably the help schools does not help enough to adaptation to the market economy and the risk of dying with heart-circulation diseases is higher.

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Regression Output:

Constant	0.835597
Std Err of Y Est	0.078539
R Squared	0.138865
No. of Observations	26
Degrees of Freedom	24
X Coefficient(s)	0.000166
Std Err of Coef.	8.45E-05

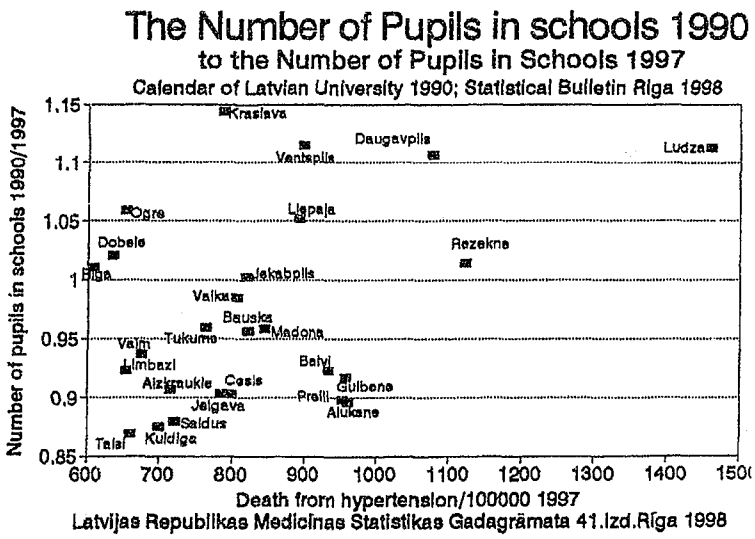

Fig.5
The number of pupils at schools of Latvia has revealed some change from 1990 till 1997. In some regions the number of pupils at schools has decreased. These regions are Krāslava, Ventspils, Daugavpils, Ludza, and Rēzekne. Calculations (not shown here) revealed that the birth rate in these regions has decreased more rapidly than in other regions. That was also true to death rate. As the consequence the number of pupils at the schools is decreasing The Standard Error of the X Coefficient is 2 times lower than the coefficient. This shows that also a decrease of pupils at schools could serve as an indicator of increasing death rate by heart-coronary diseases.

Regression Output:

Constant	-0.81864
Std Err of Y Est	0.777091
R Squared	0.169847
No. of Observations	26
Degrees of Freedom	24
X Coefficient(.s)	0.001853
Std Err of Coef.	0.000836

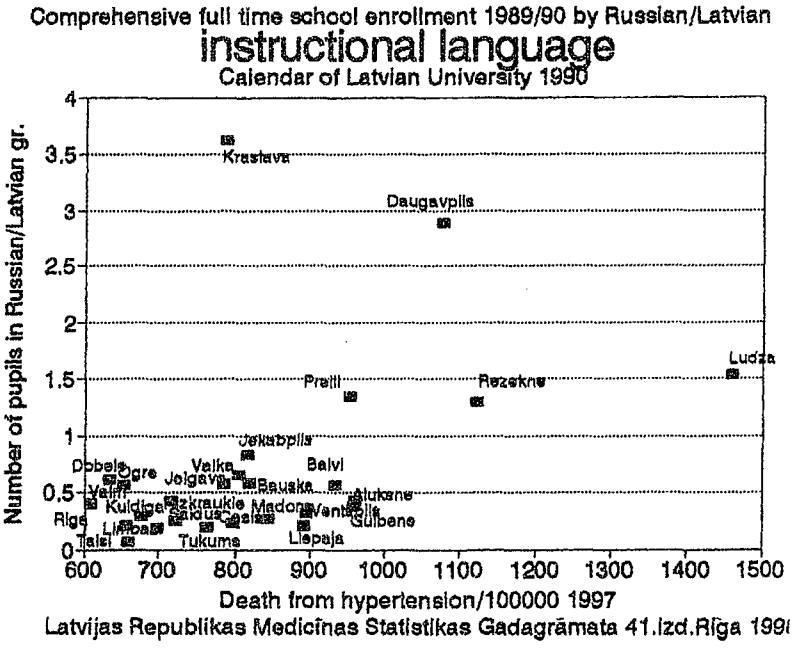

Fig.6
At 1989/90 school year there were overwhelming pupils who entered school with Russian instruction language. Presumably that was, the result of inadequate school organisation, because the most pupils of rural regions of Latgale posses Latvian citizenship. In the regions with low enrolment in schools with Latvian instruction language the risk of death from heart- coronary circulation diseases is higher than in the regions with predominantly Latvian instruction language. These former regions were not the economically situated ones (not shown here). The Standard Error of the X Coefficient is more than 2 times lowers than the coefficient.

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Regression Output:

Constant	- 0.3677
Std Err of Y Est	0.271604
R Squared	0.194087
No. of Observations	26
Degrees of Freedom	24
X Coefficient(s)	0.000703
Std Err of Coef.	0.000292

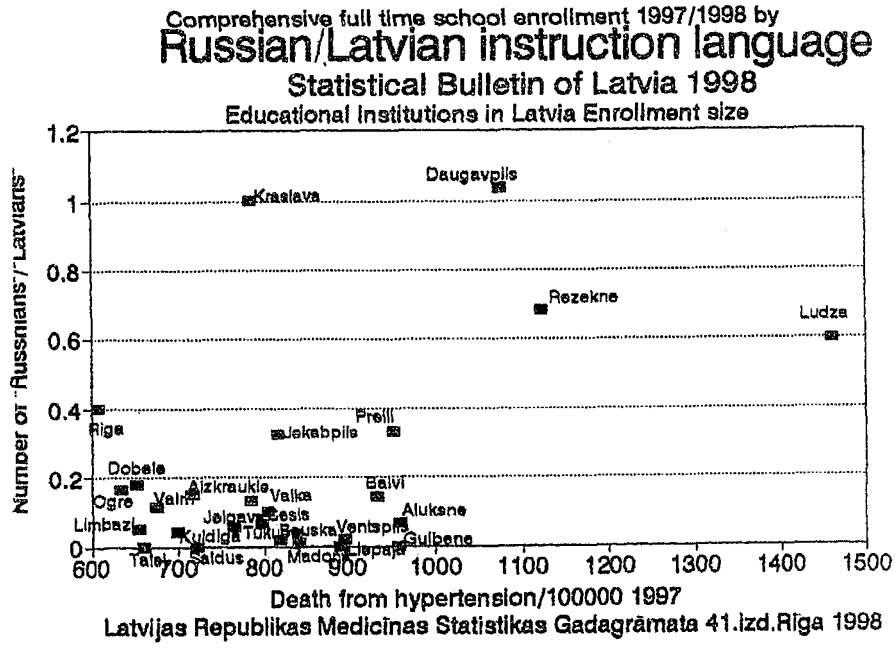

Fig.7

At 1997/98 school year there the pupils who entered school with Russian instruction language has been considerable decreased in comparison with the year 1989/90 (compare with Fig 6). Presumably that was the result of inadequate school organisation, because the most pupils of rural regions of Latgale posses Latvian citizenship from birth. In the regions with low enrolment in schools with Latvian instruction language the risk of death from heart- coronary circulation diseases is higher than in the regions with predominantly Latvian instruction language. These former regions were not the economically situated ones (not shown here). The Standard Error of the X Coefficient is more than 2 times lowers than the coefficient.

Regression Output:

Constant	0.263002
Std Err of Y Est	0.013972
R Squared	0.294266
No. of Observations	26
Degrees of Freedom	24
X Coefficient(s)	- 4.8E-05
Std Err of Coef.	1.5E-05

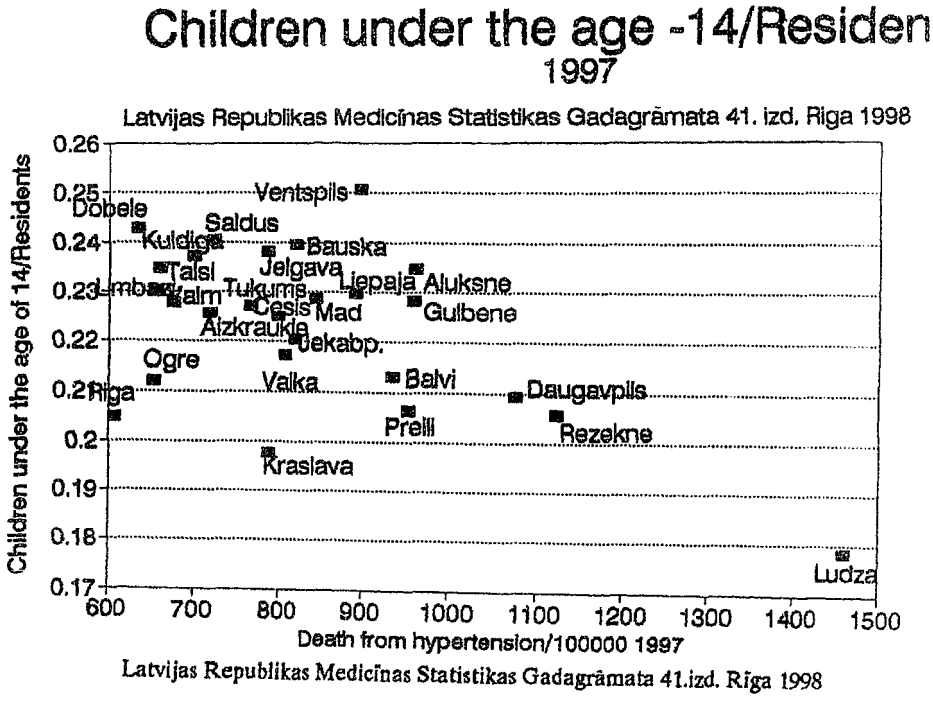

Fig. 8

The number of children under the age of 14 divided by the number of residents is not a constant one - in several districts of Eastern Latvia it is lower than in other districts of Latvia. In the former regions also the death from heart-coronary circulation diseases has increased. The standard error of the X coefficient is more than 3 times lower than coefficient itself. This shows that that the number also a decrease of the number of children to the ratio of adults could serve as an indicator of increasing death rate by heart-coronary diseases.

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Regression Output:

Constant	6.624317
Std Err of Y Est	9.171373
R Squared	0.334426
No. of Observations	26
Degrees of Freedom	24
X Coefficienfc(s)	0.03428
Std Srr of Coef.	0.009871

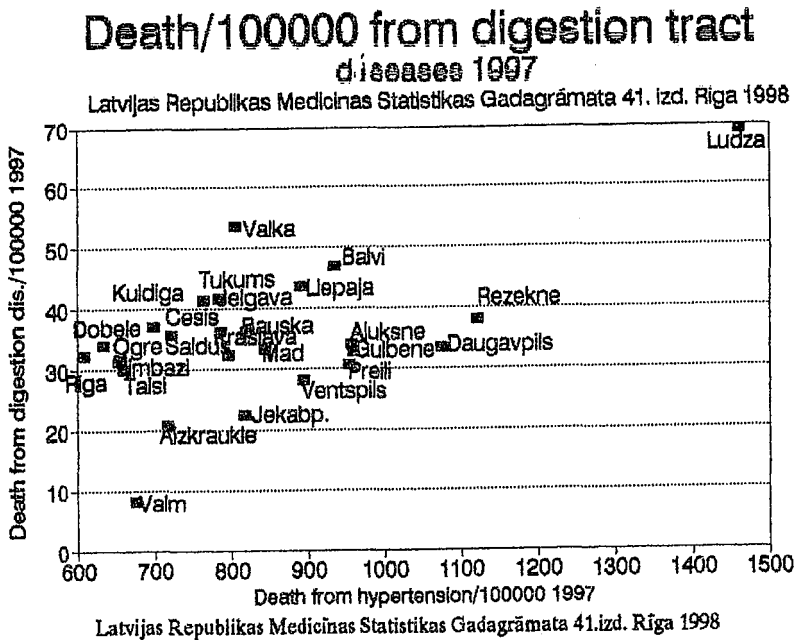

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Fig.9

The cause of hypertension is not the only-one cause of death. Another cause is the death from digestion disease. However the rate of the latter is some 30 times lower than the rate of former. However the death of digestion tract diseases reveals the same character as the death of heart- circulation diseases. The Standard Error of the X Coefficient is more than 3 times smaller than the coefficient. The probability of parallelism between both death causes may be valid with a rate more than 99%.

Regression Output:

Constant	5.731029
Std Err of Y Est	2.439304
R Squared	0.543434
No. of Observations	26
Degrees of Freedom	24
X Coefficient(s)	-0.01403
Std Err of Coef.	0.002626

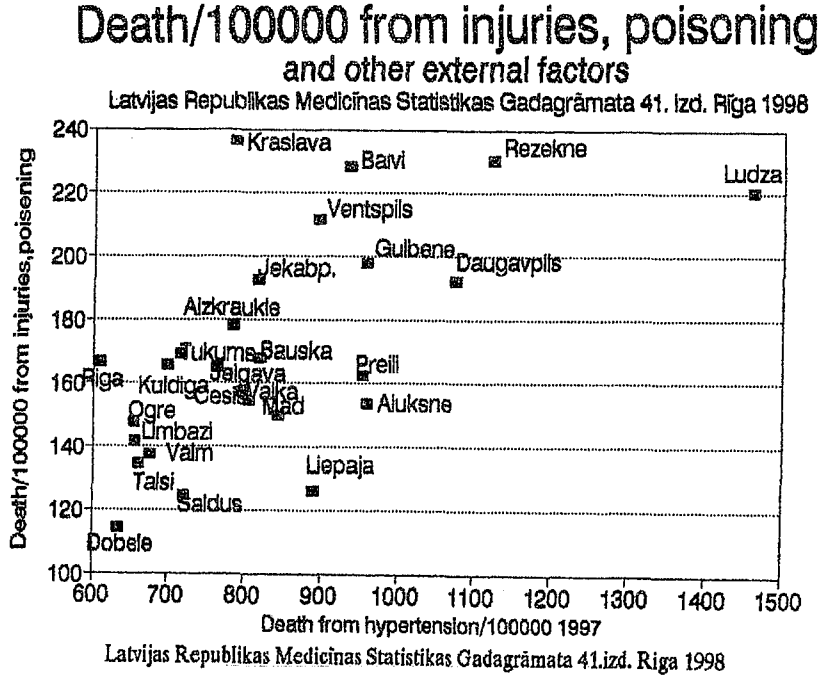

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Fig.10

The cause of hypertension is not the only-one cause of death. Another cause is the death from injuries, poisoning and other external factors. However the rate of the latter is more than 5 times lowers than the rate of former. However the death of digestion tract diseases reveals the same character as the death of heart- circulation diseases. The Standard Error of the X Coefficient is more than 5 times smaller than the coefficient. The probability of parallelism between both death causes may be valid with a rate more than 99%.

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Regression Output:

Constant	72.58036
Std Err- of YEst	0.866439
R Squared	0.330713
No. of Observations	26
Degrees of Freedom	24
X Coefficient(s)	-0.00321
Std Err of Coef.	0.000933

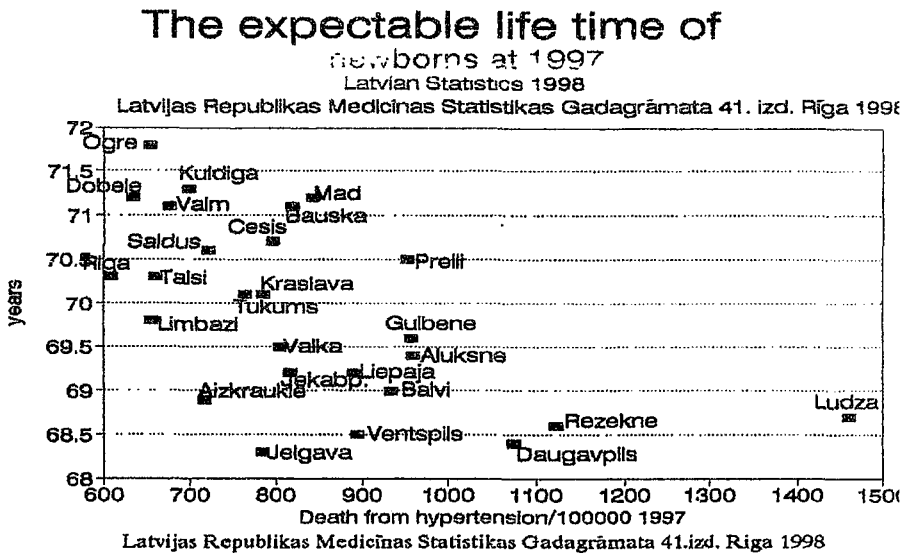

Fig.11

The expectable lifetime of new-borns at 1997 decreases with increasing death rate from heart-circulation diseases. In the Eastern regions of Latvia-Latgale the expectable lifetime is lower than in most regions of Latvia. The Standard Error of the X Coefficient is more than 3 times smaller than the coefficient. The probability of inverse parallelism between the expectable lifetime of new-borns at 1997 and risk of death by heart- circulation diseases may be valid with a rate more than 99%.

Regression Output:

Constant	5.731
Std Err of Y Est	2.439
•R Squared	0.5434
No. of Observations	26
Degrees of Freedom	24
XCoefficient(s)-	0.1014
Std Err of Coef.	0.002626

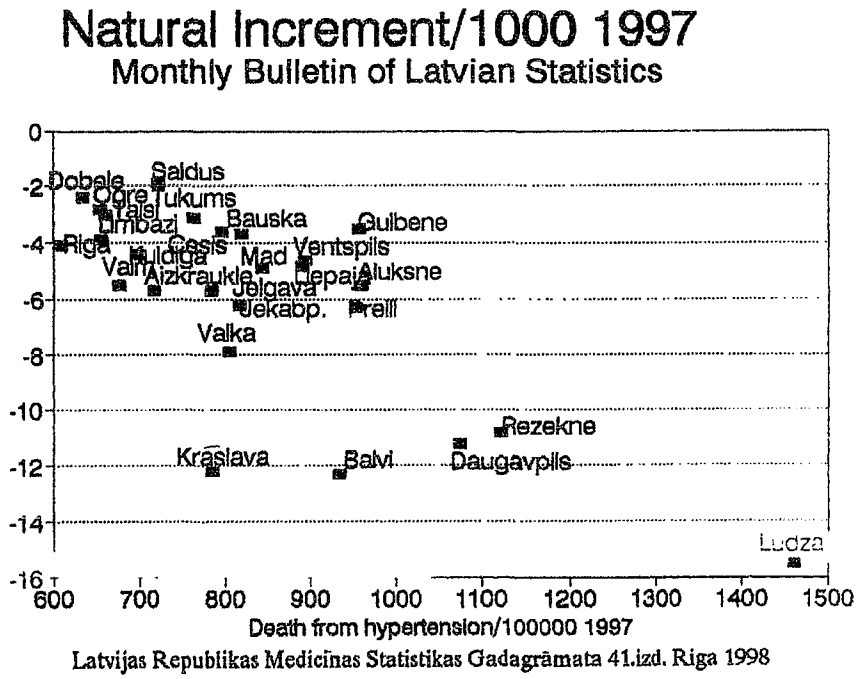

Fig.12

Natural increment of population has a negative sign in all rural territories of Latvia. That means of a dying out of the population. The highest rates of decreasing of population are in Latgale, were the decrease of population is 1,2% per year. The regions of Latgale-Daugavpils, Rezekne, Balvi, Kraslava, Ludza are the regions with the highest decrease of population. 'The Standard Error of the X Coefficient more than 5 times lower than the coefficient. The probability of the decrease of the number of population and the risk of death by heart-circulation diseases may be valid with a rate more than 99%.

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Regression Output:
Constant 0.005635
Std Eri of Y Est 0.001539
R Squared 0.640571
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) 1.08E-05
Std Eri of Coef. 1.66E-06

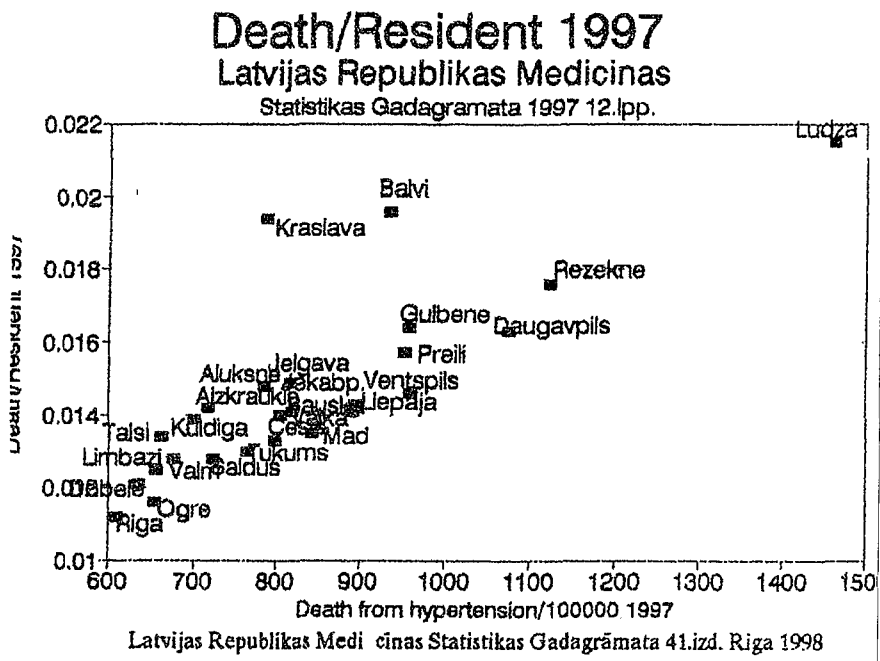

Fig.13
The death to resident number ratio goes parallel with the death rate from heart circulation diseases. The Standard Error of the X Coefficient more than 6 times lower than the coefficient. The probability of the decrease of the number of population and the risk of death by heart-circulation diseases may be valid with a rate more than 99.9%. If the death rate is low as in the regions Ogre Riga, Limbaži, Talsi then the death rate from heart- circulation diseases (on X axes) is 55% from total death rate (on Y axes). If the death rate is high as in the regions of Ludza, Rēzekne, Daugavpils then the death rate from heart- circulation diseases (on X axes) is 68% from total death rate (on Y axes).

Regression Output:
Constant 3867.036
Std Err of Y Est 499.257
R Squared 0.294188
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) -1.6996
Std Err of Coef. 0.537369

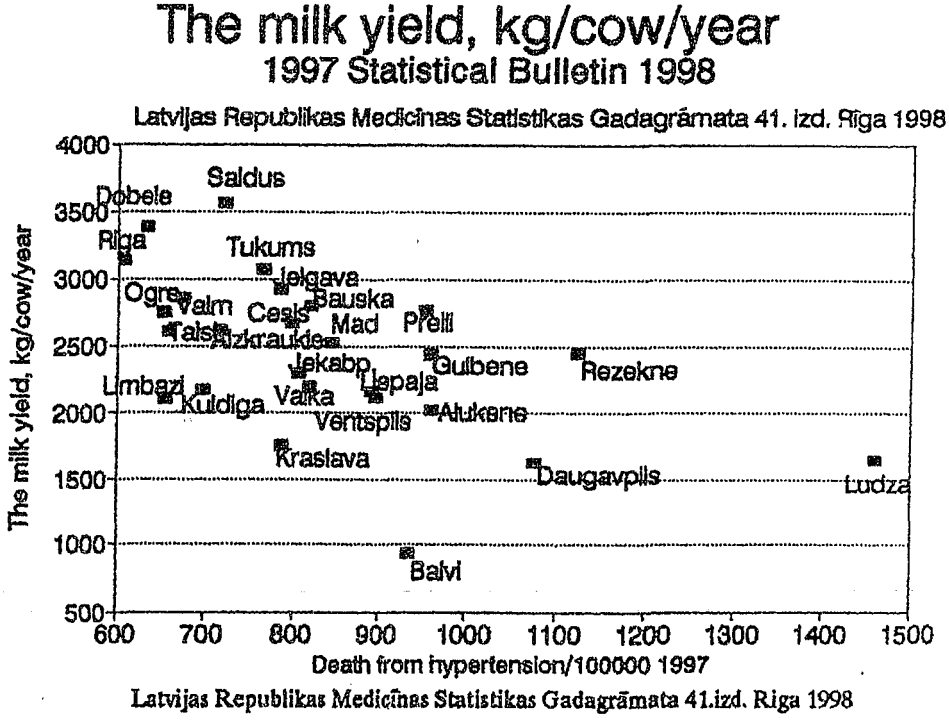

Fig.14
One of the incomes in rural regions is the income from milk. The income depends upon the yield of the milk. The yield represents the culture of diary. Lower milk yield corresponds to higher death rate from heart circulation diseases. The lowest milk yields are in the districts Daugavpils, Balvi, the highest - Saldus, Dobele. The Standard Error of the X Coefficient is 3 times lower than the coefficient The probability of the decrease of the milk yield and the risk of death by heart- circulation diseases is higher than 99%.

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Regression Output:
Constant 5.229591
Std Err of Y Est 0.670495
R Squared 0.309717
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) -0.00237
Std Err of Coef. 0.000722

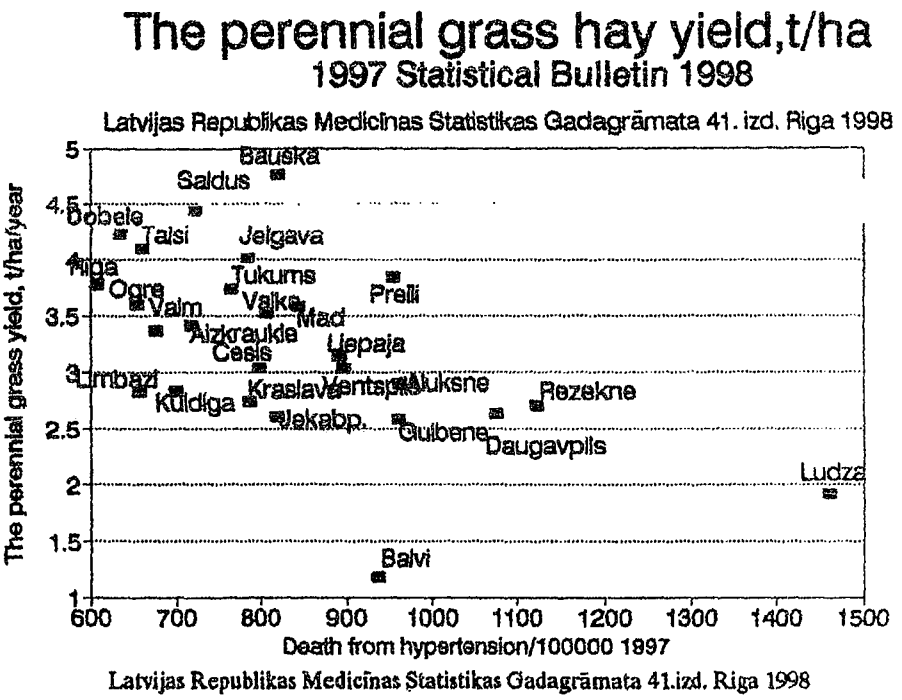

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Fig.15

In Latvia the effectiveness of the diary may be influenced by the yields of perennial grass. The yield represents the culture of agriculture. Lower perennial grass yield corresponds to higher death rate from heart circulation diseases. The lowest perennial grass yields are in the districts Daugavpils, Balvi, Rēzekne highest - Saldus, Dobele, and Bauska. The Standard Error of the X Coefficient is more than 3 times smaller than the coefficient. The probability of the decrease of the milk perennial grass yield and the risk of death by heart- circulation diseases is higher than 99%.

Regression Output;
Constant 61.85069
Std Err of Y Est 3.543818
R Squared 0.47373
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) 0.01773
Std Err of Coef. .003814

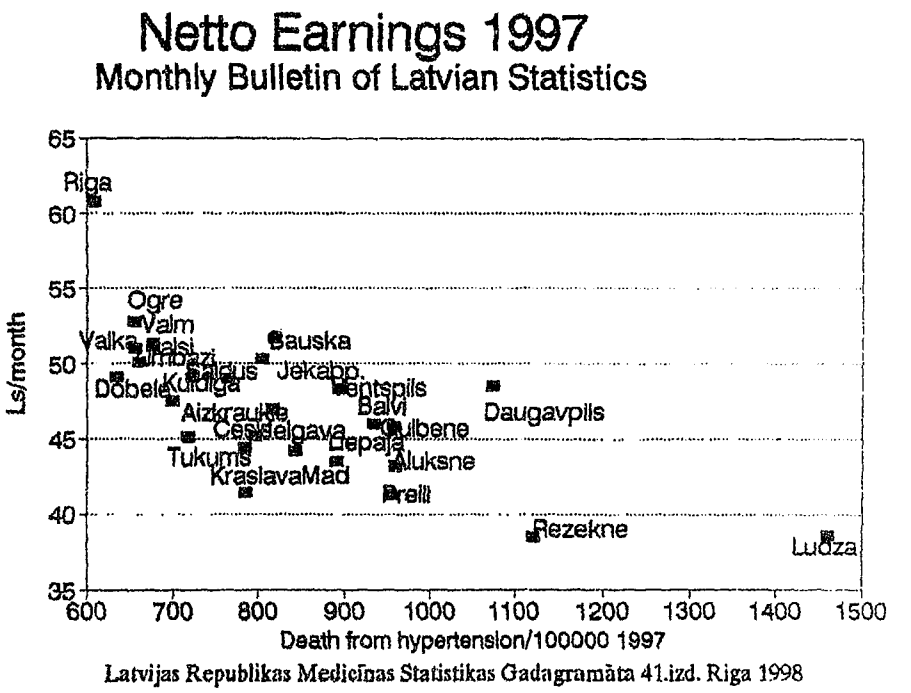

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Fig.16

In Rural districts of Latvia the Net Earnings are decreasing with increasing the death rate from heart circulation diseases. The lowest net earnings in the districts Ludza, Rēzekne, Preiļi, the highest - Rīga, Ogre, Valmiera. The Standard Error of the X Coefficient is more than 4 times lowers than the coefficient. The probability of the decrease of the earnings and the increase of death by heart- circulation diseases is higher than 99%.

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Regression Output:
Constant -7.58789
Std Err of Y Est 4.952787
R Squared 0.423465
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) 0.022382
Std Err of Coef. 0.005331

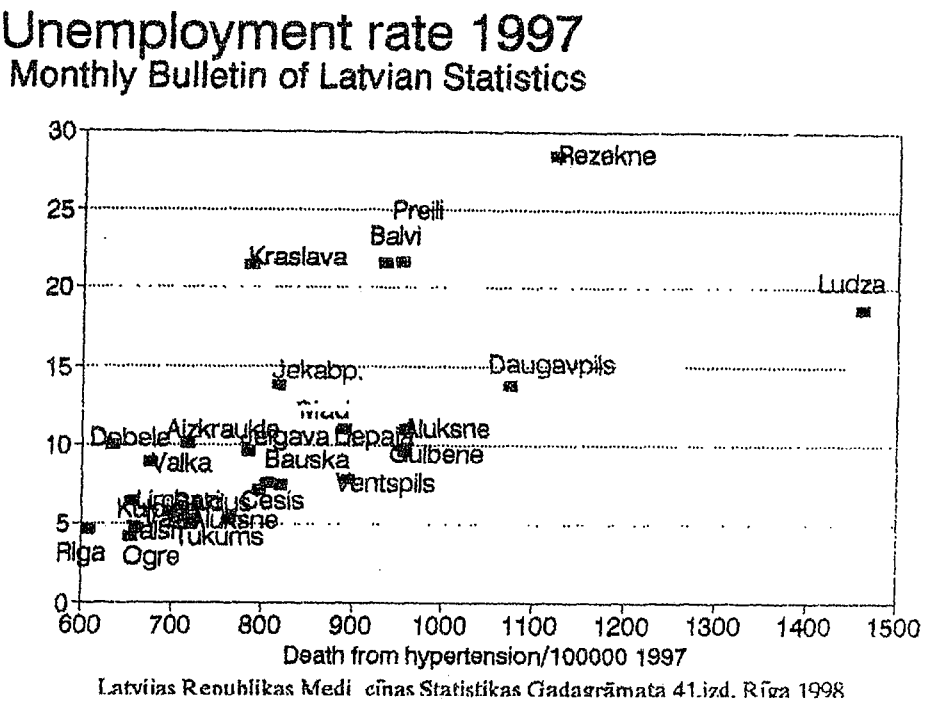

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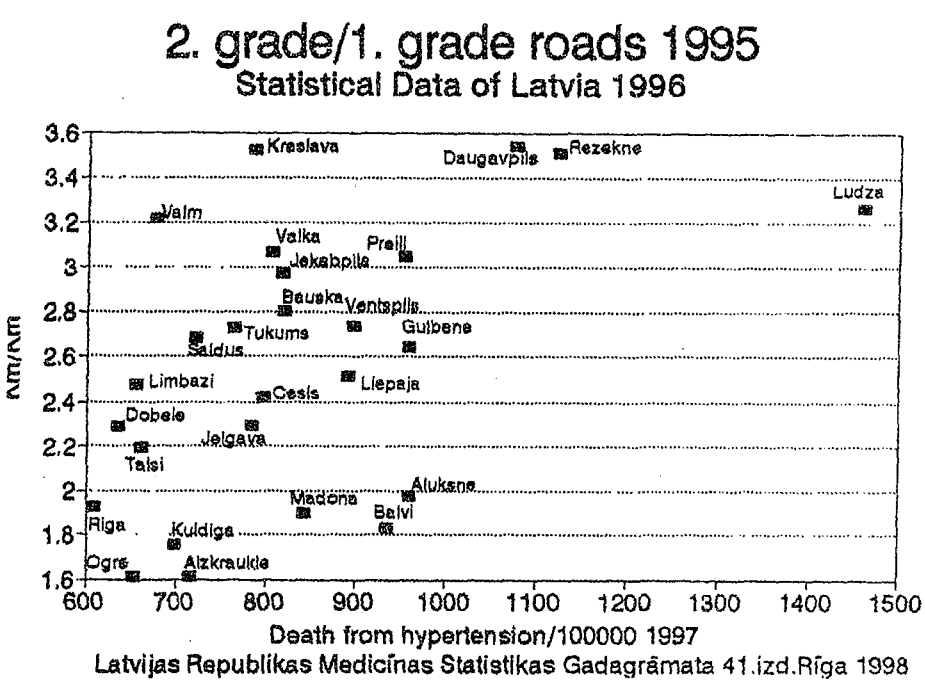
Fig.17
In Rural districts of Latvia the unemployment rate is decreasing with increasing the death rate from heart circulation diseases. The highest unemployment rate is in the districts Ludza, Rēzekne, Preiļi, Balvi, Krāslava, the lowest - Rīga, Ogre, Talsi, Tukums. The Standard Error of the X Coefficient is more than 4 times lowers than the coefficient. The probability of the increase of the unemployment rate and the increase of death by heart- circulation diseases is higher than 99%.



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Regression Output:
Constant 1.244942
Std Err of Y Est 0.533494
R Squared 0.23924
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) 0.001577
Std Err of Coef. 0.000574

Fig.18
The ratio of 2-cond grade roads to the 1-st grade roads is higher in the regions with higher death rate from heart circulation diseases. The highest length ratio of 2-cond grade roads to the 1-st grade roads are in the regions Ludza, Rēzekne, Preiļi, Daugavpils, Krāslava. The lowest are in the regions - Rīga, Ogre, Kuldīga Aizkraukle. The Standard Error of the X Coefficient is 3 times lowers than the coefficient. The increase of the ratio of 2-cond grade roads to the 1-st Grade roads correlates with the increase of death by heart- circulation diseases is higher than 99%. Presumably the quality of roads reflects the economic situation which depends from the wealth of the people, however the quality may also effect the situation, that is the death rate from heart circulation diseases.

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Regression Output:
Constant 0.589875
Std Err of Y Est 0.090232
R Squared 0.164453
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) -0.00021
Std Err of Coef. 9.71E-05

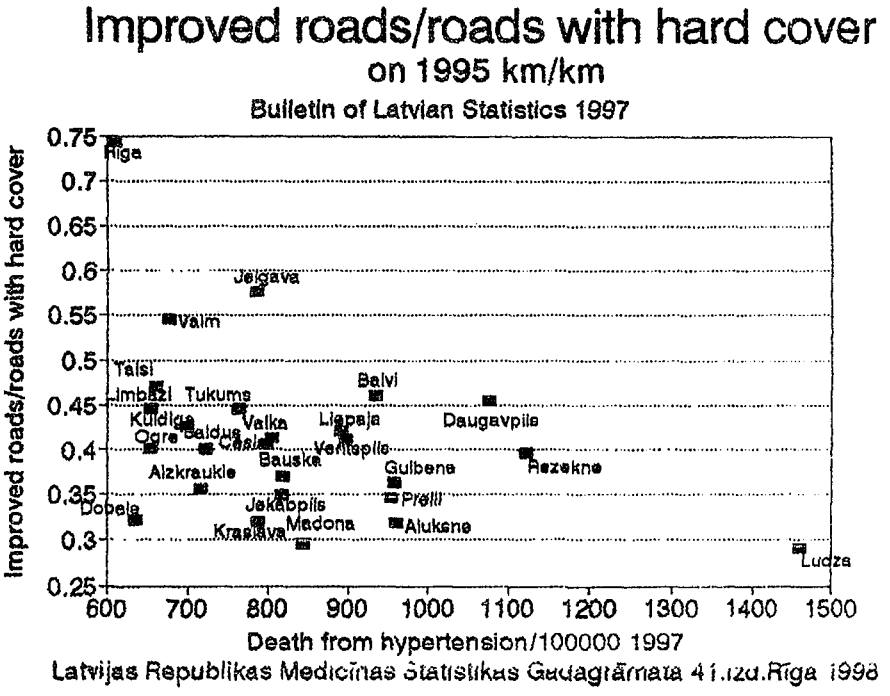

Fig.19

The ratio of the length of improved roads to the length of all roads with hard cover is lower in the regions with higher death rate from heart circulation diseases. The lowest length ratio of the length of improved roads to the length of all roads with hard cover are in the regions Ludza, Rēzekne, Alūksne, Preiļi, Gulbene, Krāslava; the lowest - Rīga, Ogre, Dobele, Limbaži, Kuldīga, Valmiera and Aizkraukle. The Standard Error of the X Coefficient is more than 2 times smaller than the coefficient. The is a probability that the increase of the ratio of the length of improved roads to the length of all roads with hard cover decreases with increasing of death by heart- circulation diseases.

Presumably the quality of roads reflects and also effects the economic and health situation of residents.

Regression Output:
Constant -1.08258
Std Err of Y Est1.488667
R Squared 0.181102
No. of Observations 26
Degrees of Freedom 24

X Coefficient(s) 0.00369
Std Err of Coef. 0.001602

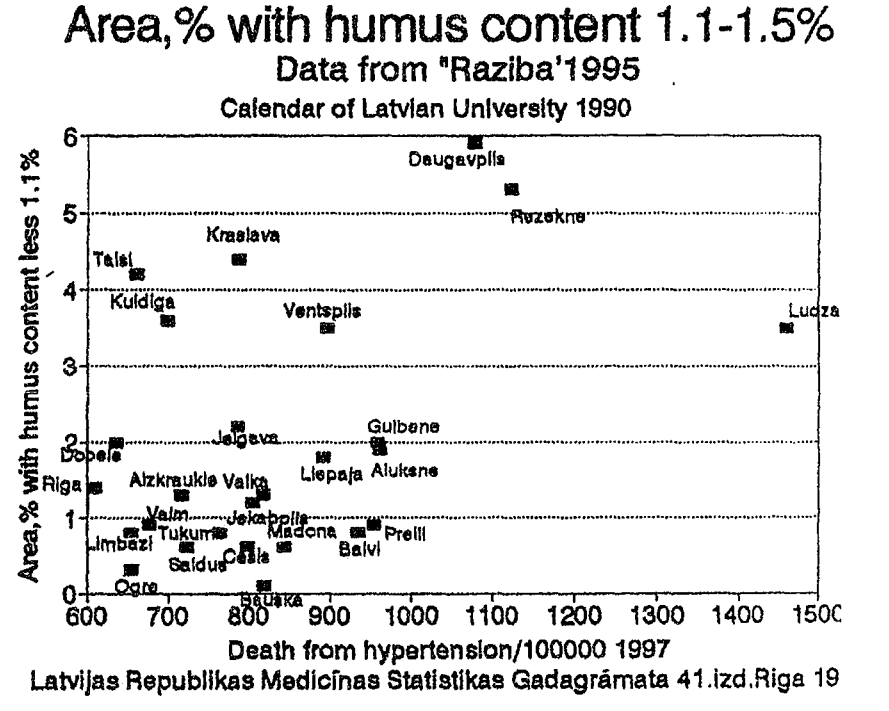

Fig. 20

The ratio of the area with low humus content to the to all area with a significance in farming higher in the regions with higher death rate from heart circulation diseases. The highest values (characterises the lowest fertility of soil) are in the regions Rēzekne, Daugavpils and Krāslava- the lowest - Ogre, Saldus and Bauska. The Standard Error of the X Coefficient is more than 2 times lowers than the coefficient. There is a probability that the increase of the area with low humus content to all area increases with increasing of death by heart- circulation diseases.

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Conclusion

Higher death rate from heart circulation diseases corresponds to regions with population with a shorter life span and lesser birth rate and higher total mortality.

Higher death rate from heart circulation diseases corresponds to regions with better successes in education – the pupils who goes to auxiliary school cannot is less, the pupil who cannot finish the second stare of basic education is less, the people with higher or secondary education are more.

Some syhmptoms show that the families in the regions with higher death rate from heart circulation diseases cauld have a higher risk to abuse of alcohol.

In the regions with higher death rate from heart circulation diseases the pupil's 1989/90 entered the secondary schools with predominantly Russian instruction language. These regions were not the economically, educationally the best situated one.

Higher death rate from heart circulation diseases corresponds to the regions with better successes in land farming quality – the caws milk yield is higher. In better quality are also the roads.

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